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AUG 31 2005

In re application:

JOHN THOMSON et al.

Confirmation No. 7938

Serial No.: 10/076,022

Examiner Tran, Khanh C.

Filing Date: February 14, 2002

Art Unit 2631

Title: Efficient Pilot Tracking Method for OFDM Receivers

* * * * *

DECLARATION UNDER 37 CFR 1.131

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

1. I, John Thomson, am a named inventor in the above identified application.
2. I have reviewed the pending Office Action dated May 31, 2004, in the above referenced application, which includes a rejection of claims 1-5, 11, 13-17, 23, 25-30, 36-38, 52-53, and 59-63, under 35 U.S.C. Section 103(a) as being unpatentable over US Patent Publication Application 2002/0065047 to Moose ("Moose"), which was filed on September 18, 2001 and published on May 30, 2002, in view of a US Patent 6,633,616 B2 to Crawford ("Crawford"), which was filed on August 21, 2001 and issued on October 14, 2003.
3. I have reviewed both these cited references. In order that the Moose and Crawford references be withdrawn from consideration as citable prior art against the claims of the present invention, I can establish a date for the present invention that is earlier than the effective dates, as defined under 37 CFR 1.131, of both the Moose and Crawford. The Moose reference has an

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effective date of September 18, 2001 and the Crawford reference has an effective date of August 21, 2001.

4. To establish that my invention was prior to August 21 2001, I rely upon an email that I sent on January 10, 2001 that included an attachment with a complete disclosure of the invention in text form, which included a date of actual reduction to practice. *See Exhibit A and Exhibit B.*

5. Exhibit A is a true and correct copy containing an email that was sent from me to Adam Tachner, then Intellectual Property Counsel (now General Counsel) of Atheros on January 10, 2001 with an attachment that is a summary of the invention with relevant dates, a true and correct copy of which attachment has been provided as Exhibit B.

6. In the attached text file, which is Exhibit B, to the email date January 10, 2001 (Exhibit A) evidence of actual reduction to practice of the invention prior to August 21, 2001 is shown. Reference is made in Exhibit B to a tape-out that occurred prior to August 21, 2001, and is reproduced here for clarity:

Was the invention "diligently reduced to practice" after it was conceived? (This is important because a good idea that rests on a shelf for a couple of years is not entitled to the same protection as an idea that is slowly, but diligently reduced to practice over a couple of years).

Yes (invention implemented in D2, taped out in August, 2000).

7. In the integrated circuit design industry, it is common practice for circuit designs to be "frozen" before a "tape-out" occurs. Thus, the "tape-out" occurs when an integrated circuit is completed and ready for testing. As set forth in Exhibit B, in the above referenced application, the

invention was reduced to practice when the circuit designs were "taped-out". Thus, the "taped-out" circuit design of the invention is evidence of actual reduction to practice as early as August 2000.

8. As demonstrated by the evidence presented herein, the invention was reduced to practice before August 21, 2001.

9. I further declare that all statements made herein that are of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

Declared at California, United States this 31st day of August 2005.


John Thomson

EXHIBIT A

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Jutras, Bobbie

From: John Thomson [thomson@atheros.com]
Sent: Tuesday, August 16, 2005 12:20 PM
To: Bruce Busby; John Thomson
Subject: [Fwd: ATH038 initial disclosure]
Attachments: ATH038_disclosure.txt

Hi Bruce,

Got your voicemail, and just did a little bit of digging around. Here's the earliest email thread that I can find on this patent. I hope this helps. Yes, we were before Feb 21, 2001. Let me know if should try to dug up more.

Thanks,

john

----- Original Message -----

Subject:ATH038 initial disclosure
Date:Wed, 10 Jan 2001 18:16:04 +0000
From:John Thomson <thomson@atheros.com>
Organization:Atheros Communications
To:atachner@atheros.com, thm@atheros.com, thomson@atheros.com

Attached is a first pass disclosure for ATH038. (It's just in text for now. I don't have Windows or VMWare setup on my machine at work. I'll convert it to a Word file at home in the next few days, but thought you'd be interested in the sneak preview.)

If you want to get together to discuss, please let me know.

john

EXHIBIT B

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PAGE 24/27 * RCVD AT 8/31/2005 10:21:29 PM [Eastern Daylight Time] * SVR:USPTO-EFAXF-6/24 * DNIS:2738300 * CSID:6502334545 * DURATION (mm-ss):06-18

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ATH038_disclosure.txt

Confidential (and Attorney-Client Privileged) Communication

ATHEROS COMMUNICATIONS, INC.
INVENTION DISCLOSURE FORM

Introduction and Purpose: Thanks for taking the time to complete this form. Securing IP is a key ingredient to our continued growth and success. This form is intended to provide a framework for you to explain your invention to the patent attorney assigned to the patent drafting task. The key to enabling the patent attorney to succinctly define your invention is to explain not only what we are doing, but (and this is just as significant) to also explain the traditional way that others have approached this field and particular challenge in the past.

NOTE: While we'd prefer you provide as much detail as possible for all of the following questions, if you're pressed for time or would rather work on this in tandem with counsel, feel free to keep your answers brief and fill in the blanks during a meeting with Adam. He'll then work with you to create a more thorough disclosure that will be either kept in-house or assigned to an outside attorney.

1. To begin, please provide a descriptive name of the invention:

An efficient pilot tracking method for OFDM receivers.

2. So that we know who all of the inventors are, please list the name or names (full legal names (First, MI, Last)) of all the people who help conceive of the invention(s) here:

John S Thomson
Teresa H Meng

Redacted.

5. Next, please explain the invention and how it is a novel solution to the problem you described above.

a. Give as much detail here as you can, and be sure to include or list any related documents and diagrams already generated by you or others.

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b. At the end of this section, try to write a single sentence that broadly encompasses the structure and function of your invention and how it's novel. Then, try to write a few slightly narrower versions of this sentence, targeting implementation details or variations on your preferred structure.

Below is a summary. The pilot tracking section of an engineering doc //depot/projects/t2plus/d2plus/tim/doc/tim.fm has many more relevant details and won't be duplicated here. It's a framemaker file checked into perforce, work in progress, but the pilot tracking section is in quite decent shape. I can make copies if anyone would like.

1) Frequency offset compensation using pilot carriers:
If there are some pilot carriers in an OFDM symbol, the rate at which the averaged pilot phases drift is an indication of the frequency offset estimation error and low-frequency phase noise. This information can be used to track and phase-correct the channel estimates during a packet, and to adjust the frequency offset estimate. Sometimes the phases of the pilot carriers are too noisy to be used directly. Filtered pilot phases over symbols often create a better estimate of the frequency offset over time.

2) Symbol timing recovery using linear phase:
Timing synchronization can be achieved by analyzing the signal's frequency domain spectrum. For example, an OFDM symbol will display a linear phase in its frequency domain spectrum if the samples are not taken at exactly the beginning of the sinusoids. The symbol timing can therefore be tracked during a packet if there are some pilot carriers whose phase displays a slope. The slope can be used to adjust the channel estimates of the data carriers. If the magnitude of this slope is outside of a certain range, then a symbol timing adjustment can be made.

3) Unification of various tracking into a linear fit:
Using a single mechanism (linear fit of the total delta pilots) to:
- adjust channel estimates to account for phase noise, timing drift due to frequency offset between transmitter and receive, and frequency estimation error.
- symbol timing adjustment
- adjust frequency offset estimation

4) Pilot deletion/weighting:
When doing a linear fit of the total delta pilots, ignore/weight pilots based on magnitude. Interpolate/extrapolate the ignored pilot before doing the linear fit, thereby requiring only one equation to compute slope and average. (In our existing designs, we ignored up to one of the four pilots. We did not weight based on magnitude.)

5) Pilot magnitude tracking:
Track pilot magnitudes and adjusting channel estimates. This compensates for signal magnitude changes, both intentional and unintentional.

Next, we move to a few important but easy to answer records-related questions:

6. When was the invention first conceived?

March through July, 2000

7. Was the invention "diligently reduced to practice" after it was conceived? (This is important because a good idea that rests on a shelf for a couple of years is not entitled to the same protection as an idea that is slowly, but diligently reduced to practice over a

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couple of years).

Yes (invention implemented in D2, taped out in August, 2000).

8. Has this invention been OFFERED for sale or DISCLOSED to others outside the company? Was such disclosure in the form of a publication? If yes (to either question), when and where?

No.

Redacted

12. In which Atheros products would the invention appear?

D2, D2+ and beyond.

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